



# Población y Salud en Mesoamérica

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### How to cite this article:

Salazar-Villanea, M., Garnier-Méndez, M., Esquivel-Baudrit, L. & Calvo-Molina, J. (2026). Living with acquired brain injury (ABI) in Costa Rica during the COVID-19 pandemic: narratives and adjustments in psychosocial adversity. *Revista Población y Salud de Mesoamérica*, 23(2). <https://doi.org/10.15517/dn31kd69>



ISSN-1659-0201 <http://ccp.ucr.ac.cr/revista/>

Revista electrónica semestral  
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## Living with acquired brain injury (ABI) in Costa Rica during the COVID-19 pandemic: narratives and adjustments in psychosocial adversity

*Viviendo con daño cerebral adquirido (DCA) en Costa Rica durante el COVID-19: narrativas y ajustes en la  
adversidad psicosocial*

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**Abstract: Introduction:** Living with Acquired Brain Injury (ABI) in Costa Rica during the COVID-19 pandemic presented significant challenges and adversities for individuals with ABI, informal caregivers, and healthcare workers. Isolation, discrimination, and stereotypes impacted psychosocial well-being, although experiences may have varied depending on the cultural context. Research on this specific population facing the pandemic in Latin America is currently limited. To address this gap, this study explored these populations' experiences during the pandemic, considering it as an adverse psychosocial situation. The potential perceived role of the proximal or collectivistic culture as a protective factor was also contemplated.

**Methodology:** The study was designed as a cross-sectional and descriptive approach, with a qualitative phenomenological focus. An open online survey was conducted to collect narratives and self-reported data. The sample comprised 35 adult ABI patients, 22 informal caregivers, and 8 healthcare workers. **Results:** Findings revealed that individuals with ABI, informal caregivers, and healthcare professionals experienced varying levels of pandemic-related fear. Narratives primarily highlighted the impact of the pandemic on various aspects such as the economy, employment, family, and social interactions. However, some individuals also reported a sense of stability during the pandemic and identified potential areas of personal growth amid the health crisis. **Conclusions:** The study concluded that participants with ABI faced dual adversity, encountering challenges during the pandemic and the repercussions of their health condition. Moreover, the collectivistic tendencies within the cultural context of Costa Rica were considered a protective factor for these populations.

**Keywords:** Well-being, Acquired brain injury, COVID-19, cultural identity.

**Resumen: Introducción:** La vivencia del daño cerebral adquirido (DCA) en Costa Rica, durante la pandemia por COVID-19, implicó desafíos y adversidades para esta población, sus cuidadores informales y las personas profesionales de salud. El aislamiento, la discriminación y los estereotipos afectaron el bienestar psicosocial, aunque estas experiencias pueden haber variado según el contexto cultural. Las investigaciones en este tema, en América Latina, son actualmente limitadas. Por ello, se exploraron sus experiencias, considerando la pandemia como una situación psicosocial adversa. También se contempló el papel percibido de la cultura proximal o colectivista como posible factor protector. **Metodología:** El estudio fue transversal y descriptivo, con un enfoque fenomenológico cualitativo. Se realizó una encuesta abierta en línea para recopilar narrativas y datos de autorreporte. La muestra incluyó 35 personas adultas con DCA, 22 cuidadores informales y 8 profesionales de la salud especializados en la atención del DCA. **Resultados:** Los hallazgos muestran que personas con DCA, cuidadores informales y profesionales de la salud experimentaron distintos niveles de miedo relacionado con la pandemia. Las narrativas destacaron el impacto de la pandemia en aspectos como economía, empleo, familia e interacciones sociales. Sin embargo, algunas personas también percibieron estabilidad e identificaron áreas potenciales de crecimiento personal en la crisis sanitaria. **Conclusiones:** El estudio mostró que los participantes enfrentaron una doble adversidad, los desafíos durante la pandemia además de las repercusiones de su condición de salud. Las tendencias proximales y colectivistas dentro del contexto cultural de Costa Rica fueron consideradas como un potencial factor protector para estas poblaciones.

**Palabras clave:** Bienestar, Daño Cerebral Adquirido, COVID-19, identidad cultural.

**Received:** 30 oct, 2024 | **Corrected:** 05 feb, 2026 | **Accepted:** 11 feb, 2026

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## 1. Introduction

The COVID-19 pandemic led to global restrictions, and social distancing was prevalent until global vaccination became available. Lower-income countries like Costa Rica faced uncertainties and socioeconomic inequalities that strained the health system (Rojas & Romero, 2022). The economic and social challenges also affected mental health, with increasing reports of fear, anxiety, depression, isolation, and loneliness, alongside limited access to medical services (Dean et al., 2021).

Reports of experiences with specific clinical samples, such as individuals with Acquired Brain Injury (ABI) during the pandemic, are limited and cannot be assumed to be uniform across different cultural contexts. Therefore, this descriptive study utilized an exploratory approach to better understand the impact of the COVID-19 pandemic as an adverse psychosocial situation for individuals with ABI, their caregivers, and healthcare professionals in Costa Rica, a country characterized by a proximal or collectivistic culture. The study aimed to explore the influence of cultural factors as a potential protective element in their perceived experiences during the pandemic. It employed a qualitative phenomenological design (Cresswell, 2013), focusing on individuals' self-narratives, perspectives, experiences, perceptions, and observations of their daily lives (Douglas, 2021). The study also measured perceived fear during COVID-19 (Jurado-Solórzano et al., 2024), changes in daily life, changes in social relationships, and perceived changes in individuals.

The study aims to provide a deeper and more personal understanding of the experiences of individuals living with Acquired Brain Injury (ABI) during the COVID-19 pandemic in Costa Rica. This Latin American country faces challenges due to a lack of standardized health interventions for ABI and fewer scientific publications compared to its European counterparts (Ye et al., 2024).

As an exploratory descriptive research, it examines the psychosocial impact of the pandemic on individuals with ABI, their caregivers, and healthcare professionals. It focuses on a relevant yet underexplored topic within the Mesoamerican context. By highlighting the unique challenges faced by this population, the study also considers how cultural factors influence their experiences, contributing to a more inclusive and contextualized understanding of the phenomenon.

## 2. Theoretical reference

### 2.1 Acquired Brain Injury (ABI)

Acquired brain injury (ABI) refers to brain damage that occurs after birth and disrupts normal brain function. The extent of impairment resulting from an ABI can vary based on the etiology and severity of the injury (Goldman et al., 2022). However, individuals and their families often struggle with physical, social, emotional, cognitive, and behavioral impairments (Salazar-Villanea et al., 2023).

ABI encompasses various adult conditions, including brain tumors, traumatic brain injuries, and disorders affecting the neurovascular and neuroimmunological systems. These conditions present a diverse array of symptoms and challenges that can profoundly affect an individual's overall

functioning. The impact often extends beyond the individual, leading to social isolation, communication barriers, and shifts in family dynamics. Consequently, individuals with ABI frequently encounter issues related to disability, as well as stigma and discrimination, which can further complicate their recovery and integration into everyday life (Salazar-Villanea & Calvo-Molina, 2025).

During the pandemic, both in Costa Rica and globally, individuals with ABI experienced exacerbated psychological and physical symptoms. This led to a decrease in their well-being, delayed rehabilitation, and health-related issues that impacted their overall quality of life. For example, previous international research has indicated that this group faced heightened levels of anxiety, depression, apathy, sleep disturbances, and social isolation (Goverover et al., 2022; Moreno et al., 2023; Wilkie et al., 2021; Wong et al., 2022).

Informal caregivers, including family members, also reported an impact on their emotional state and having experienced a perceived decline in their physical and social capabilities (Garcia-Rudolph et al., 2022). Formal caregivers, such as healthcare professionals, had to adjust their services during the pandemic. They reported increased stress levels, occupational burnout, insomnia, and fear of COVID-19, as well as symptoms of anxiety, depression, decreased quality of life, and post-traumatic stress associated with the COVID-19 pandemic (Andhavarapu et al., 2022; Fteropoulli et al., 2021; Lasalvia et al., 2021; Salmani et al., 2023).

## 2.2. Cultural dynamics and pandemic on ABI

Cultural factors, such as individualism and collectivism, may have influenced the social dynamics of different countries during the pandemic. This, in turn, affected how people perceived their emotions, responded to limited social interactions, and experienced symptoms. In distal cultures with a focus on individualism, there is an emphasis on independence, personal freedom, autonomy, and individual responsibility. In contrast, proximal or collectivist cultures prioritize interdependence, collaboration, and collective interests (Jain, 2021; Jiang et al., 2021).

Studies indicate that collectivism is associated with promoting mental and protective health behaviors through social support, but it can also lead to increased stress when individuals feel responsible for the well-being of the group (Costello et al., 2023; Kowal et al., 2020; Kotic et al., 2021; Lee et al., 2021). For example, North America and Western Europe are often characterized as individualistic cultures, while Latin America, South Asia, and East Asia are considered collectivistic cultures (Jain, 2021).

Various cultural dynamics may have influenced the COVID-19 pandemic. According to Jiang et al. (2021), individualism and collectivism played a significant role in the early transmission of the virus, surpassing the influence of other factors such as religion. Collectivistic cultures were observed to have a stronger sense of community responsibility, leading to better adherence to safety measures and behavioral changes for the mutual well-being of the community (Oey & Rahardjo, 2021).

However, these social protective factors for well-being were also challenged and disrupted during the pandemic, with new forms of discrimination and stereotypes that arose around aging, disabilities, and minority communities (Ortega-Moreno, et al., 2022). For example, the medical services regarding ABI were not given priority, and clinically vulnerable populations faced displacement in the health system. As a result, there was a need to suspend and modify services for this population (Malec et al., 2021), leading to heightened psychosocial challenges for specific groups with pre-existing health conditions, vulnerabilities, and dependencies, such as individuals living with an ABI diagnosis (Kim et al., 2022).

Rehabilitation and therapy services were disrupted or moved online, and community activities were cancelled. This led to cognitive fatigue, social isolation, and the self-reported perception of being forgotten (Bellon et al., 2023). Individuals also experienced reduced social support and increased financial hardships (Goverover et al., 2022). Specifically, in Costa Rica from 2019-2021, the National Rehabilitation Center (Centro Nacional de Rehabilitación referred by its Spanish acronym as CENARE) was repurposed as a COVID-19 facility, diminishing public care rehabilitation options for ABI patients and other possible formal or professional public care options (Caja Costarricense de Seguro Social [CCSS], 2021; Montero y Astorga, 2021).

In Hispanic cultures, such as those represented in this Costa Rican sample, the concept of familism is relevant, considering families as a crucial resource offering support and a protective factor for mental health and well-being (Valdivieso-Mora et al., 2016). It is important to understand better whether this cultural factor was perceived as significant in the experiences of coping with ABI during the pandemic.

## 3. Methodology

### 3.1 Approach

As a cross-sectional and descriptive study, narratives and self-reported data were collected during 2022 through an open online survey. The study used a mixed approach to adhere to Costa Rican pandemic guidelines, which recommended social distancing, especially for health-vulnerable groups such as ABI patients.

### 3.2 Literature review

To provide a culturally contextualized interpretation of the findings, the research team conducted a literature search designed as a contextual and exploratory strategy that aligns with the objectives. This search aimed to identify relevant theoretical and empirical antecedents that would support the study's aims.

Given the limited number of studies focusing on Latin American samples of individuals with Acquired Brain Injury (ABI) and their specific experiences during the COVID-19 pandemic, it was methodologically necessary to conduct a broad and flexible search of the available scientific

literature. This approach located high-quality sources that offered conceptual frameworks, empirical evidence, and key variables -such as culture, collectivistic and individualistic orientations, protective and risk factors, mental health outcomes, fear of COVID-19, and the burdens faced by caregivers and professionals- directly relevant to the aims of the article. Consequently, the search strategy was based on a knowledge-mapping logic rather than an exhaustive quantitative synthesis of evidence.

The team utilized databases such as Ebscohost Academic Search Ultimate, ScienceDirect, Frontiers, MDPI, ResearchGate, Cambridge University Press, BASE, Emerald Insight, PLOS ONE, AHA Journals, SSRN, Annual Reviews, PubMed Central, Wiley Online Library, Dialnet, Springer, Taylor & Francis Online, PSYCINFO, and Sage Journals to search for scientific articles published between 2019 and 2024. This time frame was chosen to capture literature emerging in response to the pandemic.

The search was also complemented by Google Scholar. In research areas characterized by emerging evidence, methodological diversity, and limited regional representation, relying solely on indexed databases may lead to the omission of early online publications and regionally disseminated research that may not yet be indexed or easily retrievable through scientific databases. This issue is especially pertinent for studies conducted in low- and middle-income countries, where scientific output is sometimes published in regional journals or interdisciplinary outlets that are not indexed.

Literature was initially screened by its titles and abstracts and subsequently reviewed in full to assess methodological approaches and extract relevant information. The final selection prioritized studies that explicitly addressed COVID-19, cultural dimensions, healthcare professionals, individuals with ABI, family members, and both formal and informal caregivers. The identification of only 17 studies involving Latin American samples, of which a small subset incorporated participants from other regions, acknowledges the scarcity of region-specific evidence and further justifies the need for exploratory, context-sensitive approaches.

In summary, while this process was not intended to fulfill the criteria of a systematic review, it represented a necessary methodological step to ensure conceptual rigor and enhance understanding of the phenomenon under study from a culturally contextualized perspective. This strategy aligns with the exploratory and phenomenological nature of the article and supports its aim to highlight the experiences of a population that remains largely underrepresented in the international literature, particularly within the Mesoamerican context.

### 3.3. Recruitment

Participants were recruited through open online invitations and advertisements on the University of Costa Rica's social networks. This "snowball" strategy was used as a non-probabilistic sampling technique. Volunteers were Costa Rican adults aged 18 years or older, who willingly agreed to participate in an online questionnaire focused on their experiences with ABI. They had to meet the following inclusion criteria: (1) willing to participate with consent on an anonymous online form; (2) consenting to share and reflect on their experiences; (3) preserved ability to communicate through written or spoken responses. Exclusion criteria included severe health conditions and cognitive or

motor sequelae that impeded participation. Some volunteers facing motor or visual challenges and limited technological abilities were assisted by research team members during data collection appointments while following all proper social distancing and face mask guidelines.

Recruiting limitations were due to the difficulty in obtaining certified data on injuries or disabilities, and constraints in Costa Rica's health system to certify these impairments or anonymously provide an official medical report. Nevertheless, the study prioritized capturing the subjective experience through the narrative-designed data collection strategy, leading to a convenience, non-probabilistic sample study with results that must be interpreted within the context and cannot be extrapolated to other groups. Effects of accessibility and social desirability were not controlled.

### 3.4 Participants

The study involved 35 ABI patients (12 men, 23 women), 22 family caregivers (3 men, 19 women), and 8 healthcare workers (2 men, 6 women) who volunteered. Previous international studies with ABI populations have typically included samples ranging from 6 to 30 participants, given the person-centred approach that focuses on the narrated experiences (Bellon et al., 2022; Costello et al., 2023).

Although the sample included volunteers from all seven Costa Rica provinces, most participants resided in the metropolitan urban area. Among ABI participants, mostly were women (65.71%), with completed college education (45.71%), and an average age of 46 years old (ranging from 26 to 76 years old). All ABI participants were employed and predominantly lived in urban areas. In the case of family caregivers, the majority were women (80.77%), who also completed their college education (61.54%), and had an average age of 45 years (ranging from 22 to 64 years old). All family caregivers were employed (92.31%) and predominantly lived in urban areas.

The 8 healthcare professionals, who specialized in ABI treatment, were mostly women (77.78%), with an average age of 39 years old (ranging from 25 to 59 years old), all were employed and predominantly lived in urban areas (see Table 1). Regarding living arrangements, 88.57% of ABI participants, 84.62% of family caregivers, and 66.6% of health professionals lived accompanied. Still, 11.4% of ABI participants lived alone, 15.38% of family caregivers, and 33.33% of health professionals.

ABI group reported diagnoses conditions such as Brain Tumors (28.5%), followed by Traumatic Brain Injuries (22.8%), Neurovascular Pathologies (20%), Non-specific Neuropathology (17.1%), Cognitive Decline (8.5%) and Immune System Related Neuropathologies (2.8%). The mean of years or time since ABI was 6.76 (S.D = 6.93, Min. = 0.2, Max. = 31.8).

**Table 1**  
*Descriptive statistics of the participants*

		Group		
		ABI (N=35)	Informal caregivers (N=26)	Healthcare professionals (N=8)
<b>Gender</b>	<b>Female</b>	23 (65.71%)	21 (80.77%)	6 (75%)
	<b>Male</b>	12 (34.29%)	5 (19.23%)	2 (25%)
<b>Age</b>		Mean= 46.6	Mean=45.1	Mean=41.1
<b>Civil status</b>	<b>Married or in a consensual union</b>	18 (26.09%)	16 (23.19%)	5 (7,25%)
	<b>Single</b>	11 (15.94%)	7 (10,14%)	2 (2,9%)
	<b>Separated</b>	6 (8.7%)	2 (2.9%)	1 (1,45%)
	<b>Widowed</b>	0	1 (1,45%)	0
<b>Living situation</b>	<b>Living alone</b>	4 (11.4%)	4 (15.38%)	3 (4,35%)
	<b>Living accompanied</b>	31 (88.57%)	22 (84.62%)	5 (7,25%)
<b>Zone</b>	<b>Urban</b>	8 (11,59%)	9 (13,04%)	3 (4,35%)
	<b>Rural</b>	27 (39,13%)	17 (24,64%)	5 (7,25%)
<b>Education</b>	<b>Higher education</b>	24 (34.29%)	21 (30%)	8 (11,59%)
	<b>Technical education</b>	3 (4.29%)	1 (1.43%)	0
	<b>Middle education</b>	6 (8.57%)	1 (1.43%)	0
	<b>Primary education</b>	2 (2.86%)	3 (4.29%)	0

*Note: This table describes the socio-demographic characteristics of the Acquired Brain Injury (ABI) participants, informal caregivers (such as family and friends), and healthcare professionals.*

### 3.5 Collection Techniques and Procedures

Based on previous studies, the procedures and tools were adapted to adhere to international standards and guidelines for managing ABI as vulnerable populations (Bayley et al., 2023; Webber-Ritchey et al., 2021).

To ensure contextual relevance and accessibility of the instruments to the sample, expert judgment was sought from neurosurgeons, neurologists, neuropsychologists, psychologists, psychiatrists, and other mental health nursing personnel who worked with ABI populations. To guarantee quality, a back-translation method was employed with the instrument items originally in English, involving translation from English to Spanish by the research team and then a literal back-translation by an external English-native speaker translator to ensure accurate meaning and alignment.

An initial pilot study was carried out to ensure sensitivity and validate the instruments, using cognitive interviews and assessing the usability and functionality of the online tools on the web platform. Based on pilot study feedback, improvements included enhancing the web design for user-friendliness, adjusting visual aspects of Likert scales (using an empty-to-full glass as a visual aid), and adding notes or reminders to each question, emphasizing the need to exclude identifying data in the narratives. The research team took responsibility for reviewing and transcribing received content while ensuring anonymity in the discourse. Respondents appreciated the inclusion of their experiences related to the COVID-19 pandemic, expressing how they found the online questionnaire user-friendly and the questions easy to comprehend.

### 3.5.1 Instruments

The study included a *sociodemographic survey*, the *Pandemic-related Fear Scale (PFS)* adapted for adults in Costa Rica<sup>5</sup> (Jurado et al., 2024), along with additional open-ended questions to explore narratives of experiences related to ABI during the pandemic.

Online applications generated a great commodity and multiple advantages to promote participation regardless of location (Salvador et al., 2020), particularly in the context of inquiring about the experiences of adults with ABI, their caregivers (family members or other close relationships), and active treating healthcare workers during the COVID-19 pandemic.

From an ideographic and biographical perspective, the emphasis on short narrative responses is highlighted, since previous research has shown that in-depth interviews with people with ABI implied difficulties in memory deficits, functional impairment, and fatigue (Douglas, 2021).

#### 3.5.1.1 Sociodemographic information

Sociodemographic variables such as age, gender, education level, employment condition, marital status, number of family members, and province of residence were recollected through an anonymous digital form.

#### 3.5.1.2 Pandemic-related Fear Scale (PRFS)

Pandemic-related Fear Scale (PRFS) is a scale adapted for Costa Rica by Jurado et al. (2024) regarding the COVID-19 pandemic. The scale consists of 8 items about the concerns on health and economic consequences introduced by the question "To what extent do you experience the following fears in

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<sup>5</sup> see [supplementary material here](#)

the current health emergency?”. The authors found an acceptable fit for the scale items:  $\chi^2/df = 1.77$ , CFI = .99, RMSEA = .047, 90% CI [.000; .089]. The correlation between economic fear and overall health fear factors was  $r = .43$  ( $p < .001$ ). The correlation between both health-related fear subscales was  $r = .61$  ( $p < .001$ ). Reliability was  $\alpha = .81$  for overall health fear (others’ health fear,  $\alpha = .77$ ,  $rSB = .77$ ; self-health fear,  $\alpha = .71$ ,  $rSB = .71$ ). For economic fear, reliability was  $\alpha = .79$ ,  $rSB = .80$ . Thus, internal consistency of these subscales is deemed acceptable. For this study the Spanish version of the PRFS was used, adding two more items based on previously reported pandemic-related fears in the groups related to ABI (“To what extent have you experienced the following fears in the pandemic?": Losing co-workers; “To what extent have you experienced the following fears in the pandemic?": Fear of not knowing what will happen in the future).

### *3.5.1.3 Open Questions Questionnaire (OQQ)*

Open-ended questions were formulated based on expert guidelines, qualitative studies, and the pilot study's cognitive interviews to explore the experiences during the COVID-19 pandemic. The questions for the ABI group were the following: “What changes were there in your life with the COVID-19 pandemic?” “What changes were there in your relationships with people during the COVID-19 pandemic?” “What changes have there been in yourself with the COVID-19 pandemic?” The OQQ for informal caregivers and healthcare professionals was similar to the one mentioned above, but with certain language adjustments.

## **3.6 Data analysis**

### *3.6.1 Statistical analysis*

The statistical analysis was performed using Rstudio (2023.03.0 Build 386). This software was used to calculate descriptive data for all participants, testing sociodemographic differences in all groups through Fisher’s exact test ( $\alpha = 0.05$ ) for education level by group, ANOVA ( $\alpha = 0.05$ ) for age by group and Chi-squares ( $\alpha = 0.05$ ) for civil status by group and living situation by group. Cronbach's alphas were applied as an internal consistency measure for the instruments. To inquire about differences in the PRFS, the Welch test of variance was implemented (using  $\alpha = 0.05$ ). There was only one missing sample from an ABI participant that didn’t complete the PRFS, this missing sample was removed from the PRFS analysis.

### *3.6.2 Narrative analysis*

Phenomenological content analysis and a constant comparison method were implemented for the narratives recollected in the open-ended questions. This was based on a previous study (Salazar-Villanea et al., 2023), which utilized a categorical system to classify and code narratives regarding ABI experiences. The present study proposes modifications to this categorical system based on new data. Using the ATLAS.ti (9.0.21.0) software, each research team member independently carried out the coding process. Whenever feasible, agreements on the classification of the narratives were reached. The total intercoder agreement was calculated for narratives regarding the three groups (Krippendorff's alpha-binary: 0.979), and the final total units of analysis were 886 fragments.

Additionally, we corrected any writing errors in the original responses and translated them from Spanish to English for publication purposes. We selected fragments that best represented each category and included them in the article discussion according to the professional criteria of the research team.

For this specific paper, the categories used are presented in Table 2.

**Table 2**

Coding system for narratives

<p>Social Disruption: References to change in general social relationships or social structure, including relations with institutions. It includes references to stigma, discrimination, and disability (217).</p>	<p>Repercussion due to COVID-19 (148): References to the impact of COVID-19 in the economic, occupational (work), familiar, or social domains.</p>
	<p>No Repercussion due to COVID-19 (69): Perception of stability during the pandemic and possible gains or personal growth during the health crisis.</p>

*Note: This table shows the category Social Disruption and its subcategories Repercussion due to COVID-19 and No Repercussion due to COVID-19. The frequency of categories for the narratives of the three groups is shown in parentheses.*

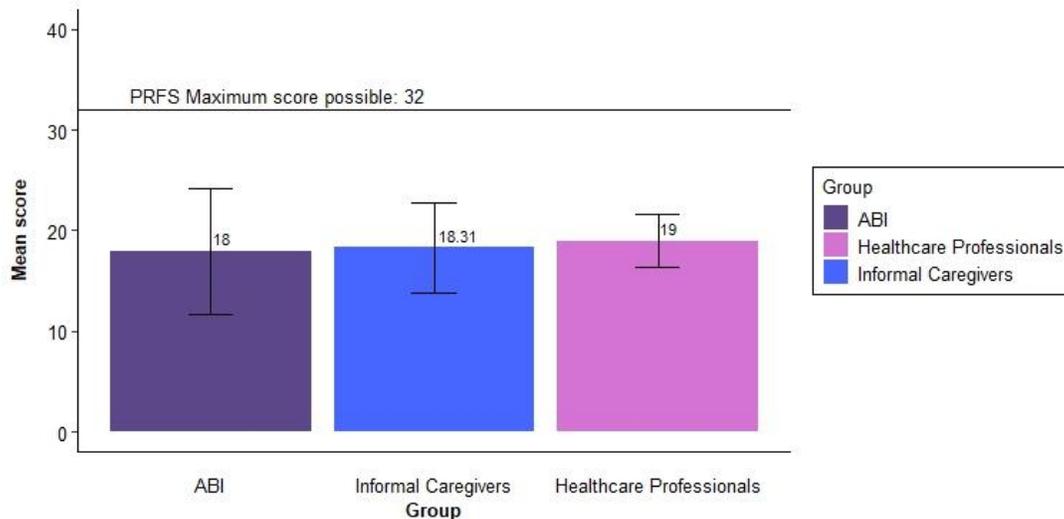
## 4. Results

Sociodemographic analysis showed no differences for education level by group (using Fisher's exact test,  $p = .459$ ), age by group ( $F(2, 66) = 0.64, p = .53$ ), civil status by group ( $X^2(6) = 3.16, p = .79$ .) or living situation by group ( $X^2(2) = 3.31, p = .19$ ).

The scores obtained from the Pandemic-related Fear Scale (PRFS) were calculated for the three groups. A higher PRFS score indicated a greater presence of pandemic-related fears. The maximum score on the scale was 32 points, and no significant differences were found between the groups using Welch-one way ANOVA ( $F(2, 65) = 0.12, p = .888$ ). For the  $n = 34$  ABI participants (1 missing participant), the average score was  $M = 18, SD = 6.26, min = 9, max = 32$ . For the  $n = 26$  informal caregivers, the average score was  $M = 18.3, SD = 4.44, min = 10, max = 28$ . For the  $n = 8$  healthcare professionals, the average score was  $M = 19, SD = 2.67, min = 15, max = 22$ , data is presented in Figure 1.

**Figure 1**

Average score for the Pandemic-related Fear Scale (PRFS)

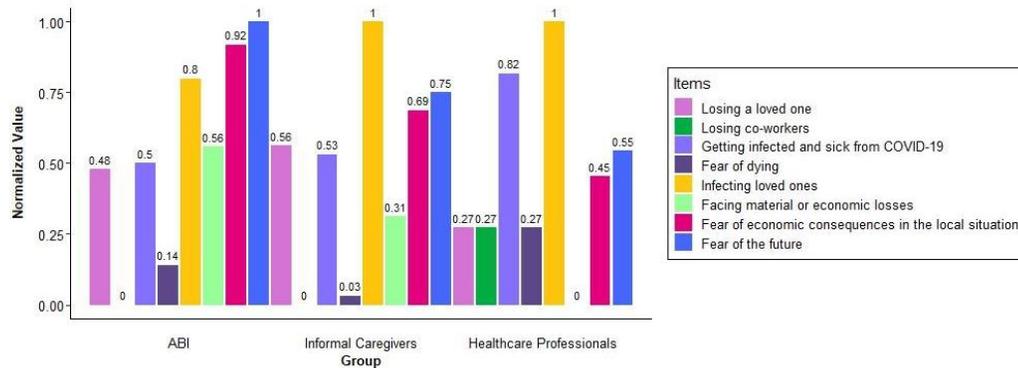


*Note:* This figure shows the average score for the PRFS, in which the maximum score was 32. The participants' mean scores are ABI=18, Informal caregivers=18.31, Healthcare professionals= 19.

We calculated the Min-Max normalization function for the PRFS to highlight each group's characteristic fears. Through this analysis, we compared the item scoring to that of Jurado et al.'s (2024) study with a non-clinical Costa Rican sample to identify possible similarities between the two studies. The results, presented in Figure 2, revealed a greater prevalence of the *Fear of the future* in the ABI group, in contrast with the Informal Caregivers and Healthcare Professionals group, in which the *Fear of infecting loved ones* is the most prevalent. In Jurado et al.'s (2024) study, *Fear of the future* was reported as the second most prevalent fear, while *Fear of infecting loved ones* occupied the third place. The most prevalent fear in that general Costa Rican sample was *Fear of facing material or economic losses*.

**Figure 2**

Total item-score for the Pandemic-related Fear Scale (PRFS)



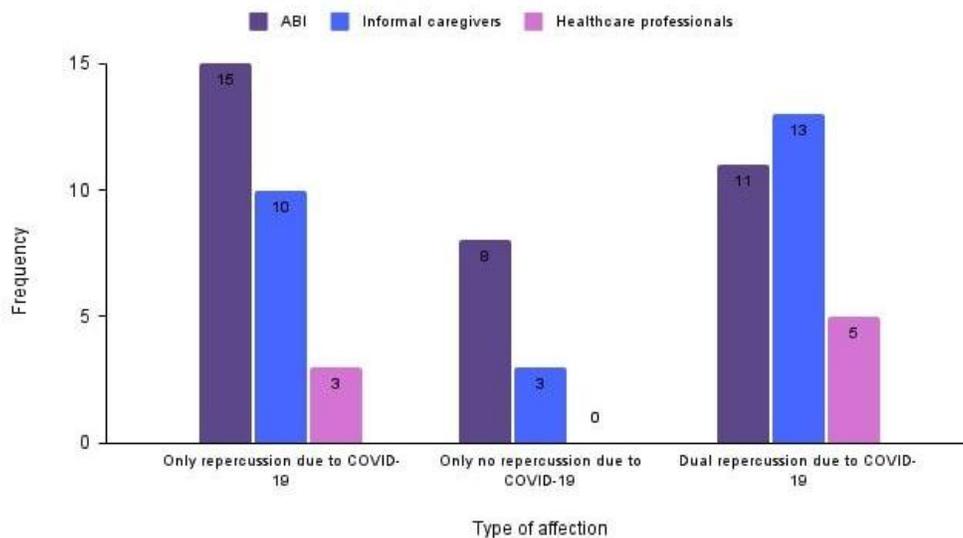
*Note:* normalized scoring for each item are 'Losing a loved one' (ABI=0.48, Informal Caregivers=0.56, Healthcare Professionals=0.27), 'Losing coworkers' (ABI=0, Informal Caregivers=0, Healthcare Professionals=0.27), 'Getting infected and sick from COVID-19' (ABI=0.5, Informal Caregivers=0.53, Healthcare Professionals=0.82), 'Fear of dying' (ABI=0.14, Informal Caregivers=0.03, Healthcare Professionals=0.27), 'Infecting loved ones' (ABI=0.8, Informal Caregivers=1, Healthcare Professionals=1), 'Facing material or economic losses' (ABI=0.56, Informal Caregivers=0.3, Healthcare Professionals=0), 'Fear of economic consequences in the local situation' (ABI=0.92, Informal Caregivers=0.68, Healthcare Professionals=0.45), 'Fear of the future' (ABI=1, Informal Caregivers=0.75, Healthcare Professionals=0.55)

#### 4.1 Narrative results

To gain a deeper understanding of how the individuals in our study experienced the COVID-19 pandemic, we analyzed the frequency of individuals whose narratives were coded as perceived repercussions due to the COVID-19 pandemic (Figure 3). The category *Repercussions due to COVID-19* included references to the pandemic's impact on economic, occupational (work), familiar, or social aspects. On the other hand, *No Repercussions due to COVID-19* referred to perceptions of stability during the pandemic and possible gains amid the health crisis. Some participants shared narratives of both *Repercussions due to COVID-19* and *No Repercussions due to COVID-19*, indicating that certain aspects of their lives were affected by the pandemic while others remained unaffected. For example, some participants did not experience worsened health conditions but did encounter changes in their social interactions. These participants were classified in the category *Dual Repercussions due to COVID-19*.

**Figure 3**

Frequency of participants for each COVID-19 category



*Note: The category Dual Repercussion due to COVID-19 was not part of the category system for classification; it was only considered for filtering participants' narratives.*

The findings indicate that most participants shared narratives about the repercussions and impact of COVID-19. During the pandemic, participants of all three groups experienced adverse effects on their mental well-being, including increased distress and varying levels of fear about their health and that of their loved ones. The narratives also revealed a heightened awareness of illness, leading to a heightened sense of mortality. Examples include:

"Being isolated for so long, many things came to a halt, and it was chaos being all stuck at home." (Informal caregiver).

"Anxiety increased, and there was a need to reschedule and rethink the ways of working and living together. At the beginning, we had to assume the risk of serious illness or death." (Healthcare professional).

"At work, the pressures increased, which triggered my inability to do things as required and with the capacities I used to have. This led me to explode in frustration and depression, to the point of wanting to die." (ABI individual)

All participant groups reported a shared experience of emotional vulnerability with disruption of their routine, despite their differing roles and responsibilities. From an interpretative perspective, these findings suggest that the pandemic acted as a pervasive psychosocial stressor, exacerbating

preexisting vulnerabilities while also creating new sources of distress related to uncertainty, isolation, and perceived threats to life.

For individuals with Acquired Brain Injury (ABI), the pandemic appears to have intensified emotional dysregulation and psychological fragility. Their accounts reflect experiences of depression, fear of relapse, and hypervigilance. While this heightened self-monitoring may represent an adaptive attempt to prevent psychological decompensation, it can also lead to sustained anxiety and emotional exhaustion. In the context of ABI, where cognitive and emotional regulation may already be compromised, prolonged exposure to stressors such as social isolation and health-related fears could likely worsen the perception of severity and chronicity of psychological symptoms.

Informal caregivers described the disruptive effects of prolonged confinement and social withdrawal on daily functioning and family dynamics. Their reports suggest a loss of structure and the erosion of routine that may have weakened caregivers' coping resources, increasing psychological strain in the interplay of caregiving responsibilities, confinement, and uncertainty in the absence of external support systems during lockdown periods.

As for healthcare professionals, their narratives showed occupational stress and existential threat. They reported a rise in anxiety and a need to reassess both their professional and personal lives, reflecting acute awareness of risk for themselves and their families, as well as for their patients. This dual exposure to increased workloads and the possibility of serious illness or death seemed to blur the boundaries between professional duty and personal vulnerability, intensifying emotional fatigue and psychological strain.

Their experiences also emphasize the crucial role of social support as a vital protective resource that shaped participants' ability to cope with the significant disruptions caused by the COVID-19 pandemic.

"My injury was discovered during the pandemic, so many things in my life changed. Being in the pandemic and working from home when my health condition changed contributed to that moment of anguish, uncertainty, fear, and learning. Having the support, care, and company of my family was fundamental." (ABI individual).

"Unemployment came, and although it affected several people, she believed it was due to the changes brought by the brain injury. Accompanying her through that process, being so close, brought to light traits and conditions we hadn't noticed before." (Informal caregiver).

For individuals with ABI, family support emerged as a stabilizing influence during a time marked by health-related uncertainty and a global crisis. Although the presence of close familiar support acted as practical assistance and as an emotional anchor, these findings indicate that while informal social support can be protective, it may become strained under extended adversity, particularly when external formal support networks are unavailable.

The interruption of rehabilitation services and the necessity to adjust care arrangements highlight the ethical and emotional challenges faced by professionals operating within constrained and unpredictable systems during COVID-19. Their reflections reveal a profound awareness of the interconnected cognitive, emotional, social, and functional consequences of ABI, especially when compounded by the psychosocial adversity linked to the pandemic.

"It was very hard. When the center where I work changed (during the peak of the pandemic), it was extremely painful to tell people that their rehabilitation sessions would be interrupted."  
(Healthcare professional)

"I have been surprised by the magnitude of the cognitive, emotional, socio-laboral, and physical and functional limitations; and the interrelation with traumatic emotional elements."  
(Healthcare professional)

While many participants reported negative experiences during the COVID-19 pandemic, a smaller group shared stories of perceived benefits. These experiences suggest that the pandemic allowed some people to make adaptive changes in time management, self-care, and family engagement. For individuals with ABI, for example, the slower pace of daily life provided opportunities for rest, enabling a greater focus on self-care. Similarly, informal caregivers noted positive aspects in teleworking, along with intentional health-related changes.

"Finding time to pause, to have more time for reflection, self-care, and rest." (ABI individual).

"Initially, I was very worried about my family; I wasn't concerned if I got sick. In reality, I never had uncontrolled fear. Teleworking was implemented, and that made my day-to-day less hectic, less tiring, with more opportunities to connect with my family. There were dietary and hygiene changes aimed at improving well-being." (Informal caregiver).

These findings indicate that perceptions of loss and gain exist on a dynamic spectrum influenced by various social, economic, and psychological factors. This variability necessitates flexible interpretative frameworks that consider contextual differences when analyzing psychosocial outcomes during large-scale crises.

## 5. Conclusions

In this study, most participants lived with their family members (88.57% of people with ABI, 84.62% of informal caregivers, and 66.66% of healthcare workers), which aligns with the characterization of Costa Rica as having familistic tendencies. The narratives indicated that families provided constant and consistent support and were perceived as the fundamental resource during challenging pandemic times. In many cases, people with ABI reported a limited support network outside their own families. This type of care and connection could be related to the experienced fear of the deaths of family loved ones reported in our survey.

The pandemic-induced changes in care provision posed additional obstacles to accessing healthcare services and emotionally impacted the participants. These experiences reflect the dual adversity faced by this population, given that they dealt with the pandemic changes as well as their ABI condition, with feelings of being vulnerable as have been described in other studies (Bellon et al., 2023; Goverover et al., 2022; Wilkie et al., 2021). ABI individuals and their families faced the previous cognitive, emotional, physical, and social ramifications of their health condition while also dealing with the limitations and changes that the COVID-19 pandemic brought nationwide. Our results are similar to other studies highlighting repercussions, where people with ABI reported having a lower quality of life, related to their brain injuries, compared with pre-pandemic reports (Moreno et al., 2023). The narratives of healthcare professionals even reflect on the different sequelae experienced by people with ABI in Costa Rica during the pandemic, which were perceived as an amplified effect, related to traumatic contexts.

Regarding the feelings of fear experienced, the means of the PRFS were similar for the three populations, and they all displayed a perception of loneliness and isolation. Findings showed that the main reported fear of people with ABI was a fear of the future, while informal caregivers and healthcare workers displayed concern for the health of their family members. Even though the sample sizes and characteristics differ from the present study, the results of Jurado et al. (2024) exhibit that the general Costa Rican population manifested a significant fear of economic losses during this period, which is not the case for our sample.

Our results showed different types of fear, from the death of loved ones and themselves, regarding their current and future work situation, as well as a decline in their mental health. These findings are similar to previous studies showing that distress and loneliness are related to fear during the COVID-19 pandemic and a chronic tendency to worry (Dean et al., 2021; Kotic et al., 2021). Healthcare workers were particularly vulnerable and reported fear (Andhavarapu et al., 2022; Fteropoulli et al., 2021; Lasalvia et al., 2021) while facing uncertainty about the pandemic and how that affected their jobs (Salmani et al., 2023).

In contrast to the references in narratives to disruption of the routine as a factor that might influence a poor psychological outcome (Dean et al., 2021; Kotic et al., 2021), or references to disruption in healthcare utilization that have also been mentioned in previous research (Kim et al., 2022), the references to social support family and expressed in the narratives in this study are considered a distinctive protective factor (Kotic et al., 2021). As seen in the narratives, the collectivistic tendencies of interpersonal relationships in the country's culture could have been a protective factor for the dual psychosocial adversity we described: Living with ABI and adjusting to the pandemic restrictions.

Together, these findings highlight that the impact of the COVID-19 pandemic cannot be understood solely at the individual level; it must be viewed within a broader psychosocial and contextual framework. The convergence of mental health distress across participant groups positions the pandemic as a collective adverse experience, disproportionately affecting those already facing vulnerability, caregiving burdens, or occupational stress. This analysis emphasizes the need for

integrative, context-sensitive mental health responses that acknowledge both individual and systemic dimensions of psychosocial distress during and after large-scale crises.

## 6. Limitations

This study should be interpreted in light of its methodological limitations, including sampling procedures and the use of self-report instruments for estimating participants' responses. As previously noted, the small sample size and limited access to protocolized and centralized information on individuals with ABI constrained recruitment opportunities and reduced the representativeness of the sample. These limitations restrict the generalizability of the findings to broader populations of individuals with ABI, as well as to caregivers and healthcare professionals, situating the results within a specific sociohistorical and institutional context shaped by the COVID-19 pandemic in Costa Rica. As this study was exploratory and descriptive, the focus was not to present strong statistical patterns.

Moreover, reliance on self-report measures and personal narratives introduces potential biases that must be acknowledged. Participants' accounts may have been influenced by recall bias, especially considering the retrospective nature of reflections on emotionally significant and prolonged experiences, such as those related to the pandemic. Additionally, social desirability bias cannot be dismissed, as participants may have consciously or unconsciously adjusted their responses to align with perceived expectations, normative roles, or socially acceptable expressions of distress, resilience, or coping, particularly in caregiving and professional contexts.

Despite these limitations, the use of self-report instruments and qualitative narratives aligns with the exploratory and phenomenological aims of the study, which prioritize subjective meaning-making and lived experience over objective measurement. Within this framework, such limitations do not invalidate the findings; rather, they define the interpretative boundaries of the results. These findings aim to provide valuable, context-sensitive insights and highlight the need for future research that employs larger, more diverse samples, multimethod assessment strategies, and improved data infrastructures to more comprehensively capture the complexity of psychological responses during and after large-scale crises. Furthermore, future studies could benefit from focusing on cultural protective factors or risk factors.

## 7. Limitations

Funded by the University of Costa Rica. The study C1326 was registered at the Research Vicerectory and approved by the institutional review board (IRB) and ethics committee. We are thankful for the support received.

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